

Further Improvement Expected

Even with these qualifications, however, the business gains undoubtedly have a foundation in genuine progress based on improved economic conditions and relationships. The crops are safe and mostly harvested; and with the long-standing surplus of farm products absorbed for the most part, the farm price structure and farm income also appear safe for some months to come. Prices of wheat and hogs have turned easier during October. However, the wheat situation is statistically strong, substantial imports of Canadian wheat for milling are required, and no material decline seems likely. The hog drop is chiefly seasonal, responding to the movement of the Spring crop to market. The cyclical upturn in hog supplies will not begin until next Spring.

The increased farm income and the greater buying power of farm products over factory goods constitute the most significant improvement in economic relationships. They gave the start to the trade gain.

Moreover, the importance of the N.R.A. dissolution in encouraging plant improvement is now demonstrated. The Schechter decision told the industries in effect that they could go ahead with plans for cost reduction without running against arbitrary restrictions and prohibitions, and the outcome has been the best buying of labor-saving machinery in five years. This buying has extended the business upswing to industries in the equipment group where depression and unemployment were particularly severe. Also, installation of more efficient equipment, and other advances in technical processes and management, enable manufacturers to keep costs and prices down, and sell their goods, while paying hourly wages equal to or higher than in 1929.

There is every reason to expect the re-equipment of industry to go on. Despite the unwillingness of lenders and of potential borrowers to take the risks of new enterprises, there is no lack of capital available to established and sound concerns for new equipment to reduce costs and improve their competitive position. The fact is that most companies of this description, which have followed the policy of "keeping strong," are able to finance their programs out of their own resources and have no need to borrow.

In short, the trend toward recovery, extending from the farm first into consumer goods lines, and this year into a group of industries which lagged in the previous "consumer goods booms," seems established. It is supported in part by artificial measures and by Government money, and it is handicapped by maladjustments of which the huge unemployment is the visible evidence. Enterprise is discouraged by the tax burden, present and future, and by un-

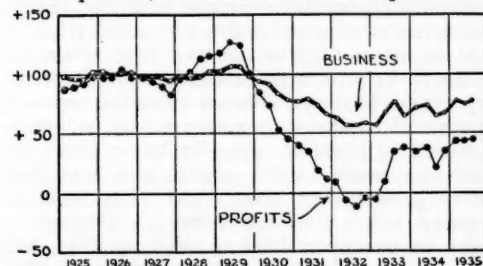
certainities as to political action still to come. Nevertheless, the handicaps have been outweighed by the natural upward movement, growing out of the desire of everyone to do business, and the natural adaptability of the economic system enables it to make adjustments in one way when they are blocked in another.

There is virtually no dissent from the view that the business gains of the Fall to date will be maintained through the rest of this year, with probably a further rise in the indexes of industrial production. The expansion of automobile manufacture, as described above, almost assures such a rise. With this support business will go into 1936 under good headway. The outlook for the first half of 1936 is the subject of increasing inquiry, but much depends upon Government expenditures, Supreme Court decisions, the new session of Congress, and European political developments; also the progress made in overcoming remaining maladjustments here, and the extent to which first quarter requirements next year are being anticipated in the current quarter. Hence the answer remains uncertain.

Third Quarter Profits

Shareholders' reports issued during the past month indicate that earnings for the third quarter of representative industrial corporations in many lines were well above those of the third quarter of last year, which was a period of reaction in business and in profits, and apparently the decline from the second to the third quarter was somewhat less than the usual seasonal extent. Earnings of the railroad and public utility companies, however, are still unsatisfactory, due to their high operating expenses and taxes.

A tabulation of the reports of 220 industrial companies shows combined net profits, less deficits, of approximately \$146,000,000 in the third quarter, while the same companies had



Quarterly Index of Industrial Corporation Profits, and the Annalist Index of Business Activity, 1926=100

a profit of \$158,000,000 in the preceding quarter and a profit of \$91,000,000 in the third quarter last year. The percentage gain over last year was 59.5 per cent in the third quarter, which compares with a gain by a similar group

INDUSTRIAL CORPORATION PROFITS FOR FIRST NINE MONTHS

Net Profits Are Shown After Depreciation, Interest, Taxes, and Other Charges and Reserves, but Before Dividends.

Net Worth Includes Book Value of Outstanding Preferred and Common Stock and Surplus Account at Beginning of Each Year.

(In Thousands of Dollars)

No.	Industry	Net Profits Nine Months		Per Cent Change	Net Worth January 1		Per Cent Change	Annual Rate of Return	
		1934	1935		1934	1935		1934	1935
1	Autos—General Motors	\$ 92,445	\$114,483	+ 23.8	\$871,498	\$872,485	+ 0.1	14.0	17.4
4	Autos—Other	D-7,234	32	+	117,521	104,344	-11.2	.....	0.1
21	Auto Accessories	10,680	16,292	+ 52.5	151,261	153,460	+ 1.4	9.3	14.0
4	Baking	11,884	10,853	- 8.7	211,269	204,710	- 3.1	7.4	7.0
9	Building Materials	5,209	8,025	+ 54.1	166,351	159,958	- 3.8	4.1	6.6
12	Chemicals	69,003	75,394	+ 9.2	909,530	959,627	+ 5.5	9.9	10.3
6	Coal Mining	1,695	1,292	- 23.8	84,364	63,422	-24.8	2.6	2.6
8	Electrical Equipment	13,186	28,911	+119.3	593,082	591,850	- 0.2	2.9	6.3
13	Food Products—Misc.	52,488	46,771	- 10.8	533,382	537,145	+ 0.7	13.0	11.5
8	Household Gds. & Sup.	14,065	15,002	+ 6.7	179,839	182,135	+ 1.3	10.3	10.9
1	Iron & Steel—U. S. Steel.....	D-11,466	D-4,241	.....	1,869,187	1,840,532	- 1.5	.....	.....
17	Iron & Steel—Other.....	D-2,805	14,427	+	730,016	723,537	- 0.8	.....	2.6
10	Machinery	4,124	6,226	+ 51.0	95,621	94,038	- 1.6	5.7	8.7
5	Merchandising	253	1,675	+564.3	89,350	91,150	+ 2.0	0.2	2.3
8	Mining, Non-ferrous	9,637*	9,517*	- 1.2	106,139	106,303	+ 0.1	11.9	11.8
5	Office Equipment	9,758	10,813	+ 10.8	128,679	133,894	+ 4.1	9.9	10.6
5	Paper Products	2,153	2,786	+ 29.4	60,263	61,395	+ 1.9	4.6	5.9
16	Petroleum	15,960	20,520	+ 28.6	837,043	796,789	- 4.8	2.5	3.3
6	Printing & Publishing	5,597	6,516	+ 16.4	68,628	64,165	+ 0.8	11.5	13.4
45	Miscel. Manufacturing	35,230	36,013	+ 2.2	496,976	506,078	+ 1.8	9.3	9.4
16	Miscel. Services	5,811	5,348	- 7.9	221,711	220,539	- 0.5	3.4	3.1
220	Total	\$337,673	\$426,655	+ 26.3	\$8,517,210	\$8,467,556	- 0.5	5.3	6.7

D—Deficit. * Before certain changes.

of companies of 14.3 per cent in the second quarter and 21.8 per cent in the first quarter. The increased percentage gain in the third quarter is of course due in considerable degree to the fact that the third quarter of last year was relatively poor.

The trend of industrial profits by quarters over a period of years may be seen from the foregoing chart which shows an index prepared from the reports of 200 leading corporations, corrected for seasonal variations, together with the Annalist index of business activity, both based on the 1926 average as 100.

Since profits for the third quarter of 1935, partly estimated, showed somewhat less than the normal seasonal decrease from the second quarter, the adjusted index advanced slightly.

It is interesting to observe that while the recovery in profits since the low point of the depression has been sharper than the recovery in general business, as measured by industrial production, payrolls, etc., the latter never declined as much as did profits and have held above profits ever since 1930. The business activity index declined from an average of 103.1 in the year 1929 to 58.7 in 1932, and recovered to 75.4 in the third quarter of 1935. The Bureau of Labor Index of payrolls in the manufacturing industries followed roughly the same course, since wages and salaries are the principal element in business transactions, and declined from 109.1 in 1929 to 46.1 in 1932, then recovered to 69.0 in the third quarter this year. The index of profits of 200 leading manufac-

turing corporations naturally fluctuated much more widely than the other indexes and declined from 117.9 in 1929 to 4.1 below zero in 1932, representing a net deficit, from which it rose to about 44.0 by the third quarter of 1935.

Results for the Nine Months

Taking the results for the first nine months, the industrial companies had combined net profits, less deficits, of \$427,000,000, as compared with \$338,000,000 in the same period last year, representing an increase of 26.3 per cent. At the beginning of the year these companies had a net worth aggregating \$8,468,000,000, on which the nine months' profits were at the annual rate of 6.7 per cent, as compared with 5.3 per cent last year.

The results for nine months, classified according to major industrial groups, are given in the attached summary. Since the tabulation is based on a relatively small number of companies, including many of the leading organizations in the field, it indicates merely the trend of earnings and does not provide an accurate measure of average earnings in particular industries or in industry as a whole.

A feature of the reports is the marked gain by leading automobile and accessory companies, also those making electrical equipment and appliances, and by specialty companies in the machinery and building material lines. Improved earnings were also shown by numerous companies in such industries as chemicals, household goods and supplies, merchandising,

office equipment, paper, petroleum and printing. Some of the steel companies made a moderate profit this year, in contrast with a deficit last year. On the other hand, lower earnings were reported by many companies in the baking and miscellaneous food industries, also in coal mining and non-ferrous metals.

A summary of railroad earnings follows:

Gross and Net Earnings of Class I Railroads
(In millions of dollars)

First Quarter	1934	1935	% Chg.
Gross revenues	\$800	\$800	.....
Net operating income.....	113	85	-24.8
Balance after charges.....	D-15	D-45	.....
Second Quarter			
Gross revenues	830	836	+ 0.7
Net operating income	114	110	- 3.5
Balance after charges.....	D-8	D-17	.....
Third Quarter*			
Gross revenues	834	871	- 4.4
Net operating income.....	116	126	+ 8.6
Balance after charges.....	D-14	D- 5	.....
Nine Months*			
Gross revenues	2,464	2,507	+ 1.7
Net operating income.....	343	321	- 6.4
Balance after charges.....	D-37	D-67	.....

D- Deficit. * September partly estimated.

It will be observed that total revenues were about equal to those of last year in the first quarter, were 1.1 per cent ahead in the second quarter and 4.4 per cent ahead in the third quarter. Because of the increase in expenditures for wages and materials, however, also the cost of the new pension bill, there was a deficit after interest charges in each quarter. For the first nine months, the cumulative deficit increased from approximately \$37,000,000 to \$67,000,000.

A representative list of twenty-five leading public utility systems, which report on the basis of the twelve months ended September 30, shows a gain of 4.9 per cent in total revenues as compared with the corresponding period last year. Because of higher operating expenses and higher taxes, however, the net income of these companies was only 3.1 per cent higher, despite the gain in gross and the saving in interest charges resulting from recent refundings of bonded debt at lower rates. The American Telephone and Telegraph System had a gain in both operating revenues and net income for the first nine months, despite an increase in operating expenses and taxes.

The Gold Inflow

With war alarms adding to the already existing causes of instability in the foreign exchange situation, gold has continued to come to the United States from Europe on every available boat. During the first 29 days of October, approximately \$268,000,000 net of gold was received at United States ports, making a net inflow of \$425,000,000 on the current

movement which commenced in September, and lifting the country's monetary gold stocks to a new high record of \$9,629,000,000. In addition to gold already received, there was on October 29th \$50,000,000 gold en route or under contract for shipment, so that all in all total purchases over a period of less than two months have exceeded \$475,000,000.

Since the first of the year gold has come in three major waves, each proceeding from superficially separate causes, but all having a common origin in the general state of disorder and confusion existing in international relations. The first wave came in January and February, and was due to transfers of funds here on the chance that a decision adverse to the Government in the gold clause cases before the Supreme Court might lead to an upward revaluation of the dollar. The second came during April, May and June, when the Belgian devaluation and French Treasury difficulties aroused fears regarding the status of the gold bloc currencies. The third, which is still in progress, commenced in September with the growing tenseness in Europe developing out of the Italo-Ethiopian controversy.

Of the gold which has come to this country during the past two months, the greater part appears to have come out of international gold hoards in London or from sales in Paris and Amsterdam by the British Exchange Equalization Fund. Direct imports of gold from London have amounted to \$123,000,000. Inasmuch as the Bank of England no longer sells gold, it may be assumed that these shipments largely represent withdrawals from private hoards by owners, many of them Americans, who have become frightened by the war clouds in Europe. Belief that the British Equalization Fund has been releasing gold in Paris and Amsterdam is supported both by the action of sterling and by the failure of the Bank of France and the Bank of Netherlands to show reductions in gold holdings equivalent to the outflow of gold from those centers. Over a period while gold shipments from Paris to New York have been \$188,000,000, gold holdings of the Bank of France have decreased only \$6,000,000; and, similarly, while gold shipments from Amsterdam to New York have been \$56,000,000, gold holdings of the Bank of Netherlands have dropped only \$3,000,000. It is thought that some of the gold acquired by the Bank of France has come from the Bank of Italy, which lost \$55,000,000 during the period; and it may be that Dutch gold stocks also have benefitted to some extent at the expense of Italian holdings. Evidently, however, most of the gold acquired by the French and Dutch banks has come from some other source, and this other source appears to have been the British Exchange Fund.

The Situation in Sterling

The foregoing indications of gold releases by the British exchange control have been accompanied by a weakness in sterling exchange that is in marked contrast with the situation prevailing prior to September. During most of the Spring and Summer sterling was strong, due partly to Continental buying on fears of devaluation in the gold bloc countries, and partly to American purchases of silver in London, especially in July and August. From May on, the rate ruled consistently above \$4.90 and in August touched \$5.00, with indications that it would have gone still higher but for the intervention of the Equalization Fund.

After August, however, American silver purchases fell off, while at the same time seasonal offerings of trade bills were increasing. Hence, even without a war scare, some reaction in sterling might readily have taken place. The war scare, however, greatly accentuated the pressure on sterling, driving the rate down to \$4.90, and, according to all indications, evoking intervention by the Equalization Fund in support of the market. In order to achieve this support, the Fund apparently bought sterling in Paris and Amsterdam, making payment in gold and so adding to the gold stocks in those centers.

Trend of European Gold Holdings

The following table shows changes in the gold holdings of five European central banks over the past two months, and at different intervals since the first of the year:

Gold Reserves of Five European Central Banks
(In Million Dollars)

	France	Nether- lands	Switzer- land	Belgium	Italy	Total
Dec. 1934.....	5,445	573	624	600	518	7,760
Mar. 1935.....	5,479	553	560	532	519	7,643
June 1935.....	4,708	427	391	609	498	6,633
Sept. 1935*..	4,777	404	448	579	406	6,614
Oct. 1935**	4,784	401	453	587	351	6,576

* First week in September.

** Latest available statement.

It will be seen that during the first half of the year all five central banks lost heavily of gold excepting the Bank of Belgium, whose currency was devalued in March. The period was one of acute alarm over the stability of the gold bloc countries, resulting in transfers of approximately \$800,000,000 of gold to the United States. At the same time the gold holdings of 50 central banks declined by \$110,000,000, notwithstanding new production of gold and Far Eastern shipments amounting to \$550,000,000. This gold went into private hoards and also into the unreported holdings of the British Equalization Fund. As indicated by the table, the Bank of France alone lost \$737,000,000 of its gold during this period, while the loss for all five banks reached a total of \$1,127,000,000.

During recent months, however, the situation has changed, as described in earlier paragraphs, and gold holdings of these banks, other than the Bank of Italy, have shown either small losses only, or actual gains, notwithstanding the current heavy movement of gold to the United States. At the close of October, all banks of the group, excepting the Bank of Italy, were still reporting a relatively high ratio of gold to sight liabilities (notes plus deposits), as indicated by the following figures: Bank of France 75 per cent, Bank of Netherlands 67 per cent, Swiss National Bank 87 per cent, Bank of Belgium 67 per cent, and Bank of Italy 20 per cent.

The fact that the gold disappearance of the first half of the year has been reversed, and that gold has been flowing back into central monetary reserves has been hailed as indicative of "dehoarding" and of reviving public confidence. Insofar as the repatriation of American capital is concerned, there is no doubt that a substantial part consists of funds being brought back to this country by owners who are now favorably impressed by prospects in the American security markets. And in the same way, a good deal of foreign capital is coming here, attracted by what are regarded as profitable opportunities in this market. On the other hand, the war scare is also a factor in the situation, and some holders of gold and balances abroad are transferring their funds to the United States, not so much because of confidence in conditions here as because of fear of conditions abroad.

Objection must be made also to the implication that gold sold by the British Equalization Fund is in the same class as gold released from private hoards. Such gold is under the control of the British Government, and even though unreported, should be considered part of the monetary stock of the country, available now for use in protecting the currency and later possibly for incorporation with the Bank of England stocks. Sale, therefore, of this gold to the United States Treasury, via the Bank of France, does not increase, strictly speaking, the aggregate monetary stocks of central banks and governments, but merely increases those of the United States at the expense of those of Great Britain.

Percentage of U. S. Gold Stocks to Total World Stocks

Reflecting the heavy imports of gold into the United States over the past two years, the percentage of the world's monetary gold stocks held in this country has risen sharply, and in August (latest month for which world figures are available) was a little over 42 per cent of the total. This compares with a post-war low of 30.5 per cent reached in June, 1932, after the departure of Great Britain from a

gold basis late in 1931 had frightened foreign owners of short-term balances in this country into withdrawing over a billion dollars in gold. It was, however, still below the peak reached in 1924. At that time, the percentage of world gold stocks held in the United States exceeded 45 per cent, as against a pre-war figure of a little over 26 per cent. Column 4 of the following table shows this percentage at the end of each year from 1913 to August, 1935.

Gold Reserves and Bank Credit
(In Million Dollars)

	50 Countries (December)	Gold Reserves U. S. (Dec.)	U. S. % of total	Loans & Investments (All Banks in U. S.) (June)
(Official figures converted at rate of \$20.67 an ounce)				
1913.....	4,857	1,290	27	20,034
1914.....	5,342	1,206	23	20,788
1915.....	6,238	1,707	27	21,466
1916.....	6,625	2,202	33	24,586
1917.....	7,139	2,523	35	28,286
1918.....	6,807	2,658	39	31,813
1919.....	6,794	2,518	37	36,570
1920.....	7,238	2,451	34	41,684
1921.....	8,029	3,221	40	40,001
1922.....	8,402	3,506	42	39,956
1923.....	8,635	3,834	44	43,737
1924.....	8,956	4,090	46	45,180
1925.....	8,973	3,985	44	48,880
1926.....	9,209	4,083	44	51,562
1927.....	9,568	3,977	42	53,750
1928.....	10,028	3,746	37	57,265
1929.....	10,306	3,900	38	58,474
1930.....	10,917	4,225	39	58,109
1931.....	11,291	4,051	36	55,022
1932.....	11,897	4,045	34	46,071
1933.....	11,930	4,012	34	40,076
(Official figures converted at rate of \$35.00 an ounce)				
1934.....	21,771	8,238	38	42,502
1935, August	21,741	9,203	42	44,600(est.)
1935, Oct. 23	—	9,629	—	—

Note: Changes in U. S. gold reserves

1913 to 1918.....	+1,368
1913 to 1929.....	+2,610
1933 to Oct. 23, 1935.....	+5,617

The Rise of U. S. Monetary Stocks

A picture of the manner in which the heavy gold inflow of the past two years, plus revaluation, has affected the monetary gold stocks of the United States is afforded by column 3 of the table given above. In the year and ten months since the end of 1933 the gold stocks have been increased by the enormous total of more than $5\frac{1}{2}$ billion dollars, most of which increase has occurred since the revaluation of the dollar on January 31, 1934. It may be that not all of our readers will appreciate the significance of so extraordinary an increase. Put in another way, it means that in less than two years time the monetary gold stocks which, together with silver, form the basis of credit and currency issues in this country, have more than doubled.

In comparison with a gain of this magnitude even the huge increases in gold stocks experienced during the war and post-war periods seem relatively small. As will be seen from the table, the net gain in gold stocks during

the four war years 1914-18 was \$1,368,000,000, and for the entire war and post-war period up to the collapse of the boom in 1929 \$2,610,000,000. In other words, in less than two years, the monetary value of United States gold stocks has increased more than four times as much as during the war, and more than twice as much as in the sixteen years 1913-29. When consideration is given to the part which the increase of gold reserves played in the great inflation of credit and extravagant speculation of those years, it is not difficult to appreciate the concern with which many thoughtful persons view this new and still greater increase in the country's gold holdings.

Moreover, the figures given above are not a full measure of the increase of the monetary base over the past two years, for they do not include the Treasury's heavy purchases of silver. These, from the commencement of the buying program to the end of August last, were stated to be in excess of 500,000,000 ounces, which, valued at \$1.29 an ounce, would be worth \$645,000,000. This silver is as effective in serving as a base for expansion as gold.

It is true that the dollars in which gold stocks and gold imports have been measured since January 31, 1934, are "new" dollars equivalent to 13.71 grains of pure gold, whereas prior to that date the measurements were in "old" dollars equivalent to 23.22 grains pure gold. This difference should be borne in mind in making comparisons, but it does not alter the significance of the comparative figures from the standpoint of potential credit expansion, since one of the "new" dollars will serve as a base for as much credit expansion as one of the "old".

Effects of Devaluation

There is no doubt but that the problem of future control of credit has been vastly complicated by the Government's policy of devaluation. The cheapening of the dollar was undertaken on the theory that it would raise commodity prices and so ease the burden upon the debtor. Actually, it is not clear that devaluation has had any such effect, since most of the advance that has taken place in commodity price indexes has been due to advances in farm products which can be accounted for by the drought and A. A. A. policies. It has had the effect, however, of leaving as a legacy this enormously expanded gold stock, which, together with that twin product of the devaluation policy — huge excess reserves — is causing great anxiety as to the future. Evidently, the Administration likewise recognizes the inflationary possibilities in the situation, for it will be recalled that Governor Eccles of the Federal Reserve Board, the Administration's chief spokesman on behalf of the bank-

ing bill passed by the last Congress, repeatedly urged these dangers as reasons for strengthening the control powers of the Board.

Of the responsibility of the devaluation policy for the major part of the huge increase in gold stocks and bank reserves over the past two years there can be no question. It was responsible at the start for \$2,800,000,000 of the increase when the gold stocks on January 31, 1934, were revalued upwards from \$20.67 to \$35 an ounce of pure gold. And it was responsible for at least a great part of the huge total of \$2,427,000,000 gold imported into the United States since. This was true for two reasons. In the first place, the new rate for the dollar greatly undervalued this currency. This had the effect not only of encouraging a heavy inflow of capital to participate in the expected rise of values in this market, but also of intensifying the economic difficulties of the gold bloc countries and so contributing to a flight of capital from them. The result was a heavy demand for dollars in excess of the supply, with consequent depression of exchange rates to levels promoting gold imports. Secondly, the gold which has come in has been counted at \$35 an ounce, instead of at \$20.67 as previously. In other words, devaluation has not only stimulated a larger quantity of gold imports, but has marked up the value of those that have come.

While bank reserves have not been affected as yet, of course, by the original \$2,800,000,000 write-up in gold stocks at the time of revaluation, since the Treasury has not yet expended this gold "profit" (other than for the redemption of Government bonds carrying the circulation privilege in which case the effect of such expenditure upon the market was offset by the retirement of an equivalent amount of bond-secured currency), they have been directly and immediately affected by the \$2,427,000,000 of gold imported since revaluation. As this gold has come into the country it has been sold to the Treasury and the proceeds deposited by the banks in their reserve accounts at the Federal Reserve. As the banks, however, have been unable to employ these additional reserves in their lending operations, the result has been to simply carry the total of excess reserves higher than ever. Already at the time of revaluation, the total of these excess reserves was approximately \$800,000,000, having been built up largely as a result of Federal Reserve purchases of Government securities in 1932 and 1933, undertaken for the purpose of easing the money market. Now, thanks to the heavy flow of gold, they are in the neighborhood of three billion dollars; short-term money rates have been driven down practically to the vanishing point, prime bonds have been forced up to the highest prices since

the turn of the century, and lenders everywhere are at wits end to know what to do with their money.

Where A Danger Lies

This is not a normal or a healthy situation. Over and over again history has demonstrated that there is danger when money is too cheap and too easy to borrow. It is in just such times that the seeds of inflation are planted, as was shown by the experience with the great imports of gold during the war, and again by the results of the Federal Reserve cheap money program in 1927.

One of the unfavorable consequences of the present glut of money is the effect on bank earnings. While bank income has been cut both by the low interest rates and by the slack demand for loans, ordinary operating expenses have held up despite the reduction or elimination of interest paid on deposits; and cost of Federal Deposit Insurance has been an added burden. Thus at a time when the banks ought to be recouping their losses of past years and building up their reserves against future contingencies, most of them are having a struggle to make a bare living. Under such conditions the danger is that bankers may be driven under pressure of the need for earnings to a lowering of credit standards, thus leading to a deterioration in the quality of banking assets.

Nor are the difficulties of finding suitable employment for money confined to banks alone; investors of all kinds are being forced by their necessities to place security secondary to rate of return. The result is many second grade bonds are selling at first grade prices, and there is a constant spilling over of investment funds into the stock market. In other words, investors, in their efforts to maintain some semblance of their former incomes, are being forced, wittingly and unwittingly, into the position of speculators. Clearly, this is an undesirable trend, and one which is likely to result in a rude awakening for many at some future date.

A Warning by the President of the Stock Exchange

Recently, discussion of the possibilities of a new inflation and boom developing out of the present monetary situation has received impetus from some very timely remarks by the president of the New York Stock Exchange, Mr. Charles R. Gay. In an address on October 9 before a conference of the American Management Association Mr. Gay said in part:

The principal danger, however, lies entirely outside of the mechanism of the Stock Exchange. It is to be found in the banking situation, which is characterized by unprecedentedly low money rates and by the greatest surplus reserves ever recorded. The ineffectiveness of these rates and these reserves is eloquent testimony to the state of shattered confidence and of subnormal business activity through which we have been passing. Given a sufficient degree of con-

fidence, or perhaps of desperation, or even of reckless boredom over the prolonged idleness of money, a situation could develop which would threaten the gravest consequences through an upward flight of security prices. With business today at a far lower level than in 1929, it is unpleasant to contemplate the consequences of a runaway stock market inflation. In this early stage of economic convalescence the country cannot afford to permit a dangerous inflation in security prices, from whatever cause it may arise.

This warning is pertinent, and is deserving of the widespread publicity which it has received. No one knows whether inflation will come or not, or if it does come, when, and Mr. Gay did not make any predictions. He has, however, performed a public service in calling attention to the dangers existent in the situation. It augurs well for our ability to better control inflation that the authorities of the Stock Exchange are thinking along these lines.

The outstanding fact to be borne in mind is that, directly or indirectly as a result of Government action, there has occurred a vast increase in the potentialities for credit expansion in this country. Within two years the monetary base of credit has been lifted to levels more than twice as high as at the time of the great stock market boom in 1928 and 1929. We have already referred to the great rise in gold stocks during and immediately following the war. How this affected the volume of bank credit in this country is shown in the last column of the table on page 167. It will be seen that while gold reserves increased by \$2,610,000,000, or 200 per cent, the total loans and investments of all banks increased by approximately \$38,400,000,000 or 192 per cent. In other words, the expansion of bank credit very nearly paralleled the increase of gold stocks. And now, within two years, the gold stocks have had a further rise more than twice as great as in the period from December 31, 1913, to December 31, 1929!

It is true, of course, that so long as there is doubt and confusion in the minds of business men, demands for credit will be held in abeyance, and the huge stocks of gold and the idle bank reserves remain unutilized. It is doubtful, however, that the practice of borrowing money has gone permanently out of fashion. At some time—perhaps soon, perhaps not for a considerable period—money is likely to be wanted for expansion. Then, with a rising tide of business and with optimism spreading throughout the land, there will once more be a strong urge to exploit the credit resources to the limit.

Efficacy of Control Measures

This possibility of a revival of the boom spirit, at a time when there is so much inflationary fuel lying about, is what is causing concern. No doubt effective means exist for combatting a credit conflagration if the authorities are willing to employ them with vigor and determination. The provisions of the banking act of 1933 and the securities and

exchange act of 1934 give the Federal Reserve Board and the Securities and Exchange Commission broad powers for controlling the volume of credit employed in the stock market, and for regulating security trading. The banking act of 1935 strengthens the authority of the Federal Reserve Board in matters of general credit policy; the Board could, if it wished, mop up the excess reserves of the member banks by raising reserve requirements in conjunction with a reduction of the \$2,430,000,000 holdings of Government securities by the Reserve Banks. The question which gives anxiety is not whether the Governmental authorities that have assumed control of affairs have powers adequate to prevent inflation; it is whether they will recognize inflation when they see it, and, if they do recognize it, whether they will have the courage to do anything about it. Putting the brakes on a boom is about the most thankless job that any control body can undertake, and the job is not going to be made any easier by the existence of an enormous gold stock, which, in the public mind, will be held to deny the necessity for restrictive measures.

Budget Balance Essential to Credit Control

One thing is clear—until the budget is in balance, or is moving definitely towards a balance, the authorities will be in an exceedingly awkward position for combatting any inflation that gets started. So long as the Treasury is constantly having to come to the market for increasing sums the hands of the Federal Reserve Board are tied. Although it would be desirable all around to have excess reserves less abundant and money rates re-established at more normal levels, there are evident difficulties in the way of such a readjustment pending an improvement in the Federal finances. With the present high prices for Government securities mainly dependent upon cheap money, there is reason to fear that a move on the part of the Reserve Banks to draw in some of the money slack would be a signal for heavy selling of Government issues. This would impair the market for Treasury offerings at a time when the Government needs money, and might prove disastrous to many banks, which, for lack of other outlets for their funds, have invested heavily in Government securities at high prices. It is unlikely that the Government will want to invite either of these contingencies. Should the Reserve Banks undertake independent action to reduce excess reserves by the sale of Governments, the probable outcome under present conditions would simply be a transfer of such holdings to the Stabilization Fund, leaving the effect on excess reserves nil.

The budget, in short, is a primary consideration in any scheme for controlling credit. With

a balanced budget, the Reserve Banks would no longer have to consider Treasury needs in determining monetary policy. They would be free to reduce excess reserves whenever they wished to do so. While the effect of such action upon outstanding Government bonds would still have to be considered, in view of the large holdings by banks, the improved status of Government credit resulting from the elimination of deficits could be counted upon to exert some sustaining influence in the market.

Wealth and Its Distribution

This is the fourth article in the series under the above heading. The first described "wealth" as "desirable things" and illustrated the rapid increase in its production and distribution in the last fifty years by the career and methods of Mr. Henry Ford, an outstanding industrial leader of the modern type.

The second article described more fully the rise and expansion of the automobile industry to first place among the industries of this country in value of production, although in the early years of the industry the passenger car was regarded beyond the reach of any but the "wealthy" but limited class that had afforded a market for "carriages" (now an obsolete term). Also, this article, by way of affording another illustration of the production and distribution of wealth by modern methods, and of the creation of privately owned fortunes, presented two examples from the shoe industry of the economic and social services of individuals possessing qualifications for leadership.

In a history of wealth production and distribution, shoe production by modern methods, like the automobile industry and the electrical industry, would belong much later in the story. Industry had a long way to go before it could make automobiles or even shoes by modern methods, or use electrical power. The demand for food was even more imperative than the demand for shoes, and except in northern latitudes in winter time the great mass of the people went barefoot down to less than one hundred years ago.

This fact affords only a faint idea of the poverty of the people—the *scarcity of wealth*—in the times before machine production. Wealth, as nominally rated—the wealth of the "rich"—existed mainly in land and buildings, known as "real estate," and in domestic animals, the products of a pastoral civilization. Of consumable wealth in the markets there was but little.

Evidence of the hopeless state of poverty in England at the time of the colonization of America is afforded by the system of indentured servants, by which many emigrants bound themselves to service as laborers for terms commonly of four to seven years, with-

out wages, to pay for their ship passage to the new and almost unknown country. The records indicate that approximately one-half of the population of the colonies came on such terms. Wages always had been but little more than sustenance. On the continent of Europe, long after this time, the greater part of the population was in serfdom, attached to the land where born, and owing service to the landlords. The immigrants to this country found land and natural resources in plenty, but had only their hands and a few hand tools with which to produce wealth. There were game and fish for the catching, timber for the taking, free pasture for cattle and sheep, but the bare necessities of life could be had only by hard labor over long hours.

Before the "Machine Civilization"

It is difficult for anyone living in the 20th Century to comprehend either the poverty or the ignorance of the masses of that time. All classes alike were enshrouded in a pall of ignorance of many material facts that concerned them intimately. Of the vital organs and processes of their own bodies they knew almost nothing. Little was known of the nature or cause of disease, and the people died like flies in the terrible epidemics which from time to time swept over all countries.

The growth of man's knowledge about the mechanism of his body and its disorders has accompanied the growth of his knowledge about the universe around him and the natural resources upon which he depended for subsistence. All knowledge is related and creative minds are universal in their interests. The exceptional men, the observers and thinkers, possibly one in a million, now and then happened upon a clue, followed it up and discovered something. One at a time these steps were taken, first in one country and then in another, and the foundations were gradually broadened. A new world of never-ending surprises and ever-multiplying interests began to unfold, about the beginning of the 19th Century. However, this was a critical time. The pressure of an increasing population upon the means of subsistence had led many people to accept the pessimistic theory of Malthus, to-wit: that an excess of population over the food supply was a fixed and inevitable fact in the nature of things, unless the increase was voluntarily restricted. Wars, famines and plagues might be considered mitigating circumstances.

The Advent of Steam Power

In this third article was reviewed briefly the development of efficiency in the generation and application of steam power, first to 1876 and then to this time, with acknowledgements to Professor Robert Anderson of Stevens Institute for the first period, and Mr. Geo. A. Orrok,

Consulting Engineer, for the later and entire period.* Illustrating the effects of chemical changes, as predominantly distinguished from those of mechanical changes, we give the following additional table, prepared by Mr. Orrok, which shows the gains in production of pig iron from 1860 to 1930. The height and upper part of furnaces remained unchanged; the hearth, or base, was widened to increase capacity, but the principal factor in quadrupling the product was the progressively rising temperature of the hot air blast that was increasing combustion. This was an application of chemistry—of the "know how!"

1860—Early blast furnace 80 to 90' high blast, 6' 0" hearth, production 280 tons per day.
1890—Blast furnace 90' high hot blast, 10' 0" hearth, production 450 tons per day.
1915—Furnace 90' high hot blast by-product coke, 15' 0" hearth, production 800 tons per day.
1930—Furnace 90' high hot dry blast, 20' 0" hearth, production 1200 tons per day.

Note: Height and bosh constant; hearth progressively increased, also burden; coke per ton, reduced to 1600 lbs. from 3,000 lbs.; air blast increased about 200%.

This is a striking demonstration of gains in production accomplished through knowledge of the laws of physics and by conforming industrial practice to them. But here is another point to be emphasized: The value of superheated steam was known as early as 1830, but attempts to use it were abandoned, because the animal oils then used in lubrication would not stand it. It came back about 1900, when the lubricating products of mineral oils became available. Thus development of power waited many years for the birth and development of the petroleum industry.

On the other hand, an efficiency gain that is no less scientific but belongs to a mechanical agency, is seen in the turbine engine, first used for water and later for steam. This is a method of power-application differing from that of the cylinder and piston by including a driving force of controlled energy, as illustrated by a "head" of water. Other mechanical aids have been found in boiler and furnace construction to obtain the most rapid and complete combustion of fuel and the highest possible utilization of heat. Air blasts were resorted to in making steam, as in making pig iron, then hot air and then the superheater mechanism, to get the heat units from the coal to the water with the utmost urgency.

The aim of the engineer, like that of the good dairy farmer, is to have the best conversion machine he can get, and feed it to its capacity. Both are liberal feeders. Pulverized coal with air mingled burns faster and about 1920 had become standard equipment in

***Note:** The statistics of power-producing machinery for the entire period, and for coal consumption were supplied by Mr. Orrok, an eminent authority, since 1927 a lecturer on steam engineering at Harvard University.

large plants. Hand-firing kept the pace until about 1910, and then gave way gradually to the automatic stoker, and a recent canvass of 14,532 industrial plants in the Middle West and South by Appalachian Coals, Inc., revealed that of the aggregate coal consumption 80 per cent was mechanically fired.

The above affords a general description of the methods patiently and studiously developed by engineers over the period of fifty-two years, from the opening of the Pearl Street Edison station, N. Y., in 1882 down to 1934. The Edison power plant was up-to-date in all respects. We gave figures last month comparing latest coal consumption per kilowatt hour with that of the best power plants in 1876; we give herewith authentic figures for coal consumption by the Pearl Street plant in 1882 and the average consumption of coal or equivalent fuel for all central power stations in the United States at ten year intervals down to 1902 and five thereafter until 1933 and 1934.

Fuel Consumption per KWH. by All Central Power Stations, 1882-1934

Coal (or Equiv.) Consumption, KWH		
1882.....	10.0	1922..... 2.5
1892.....	8.0	1927..... 1.84
1902.....	6.7	1932..... 1.50
1907.....	5.4	1933..... 1.47
1912.....	4.4	1934..... 1.44
1917.....	3.3	

Note: The figures for 1892 were compiled by the National Electric Light Association at that time. Subsequent figures are by the United States Bureau of Mines or Geological Survey.

Although a railroad locomotive presents problems of its own, the improvements in steam-making described above have been applied to it also. Available figures for coal consumption do not go back as far as the above table, but the average freight train load of all class I railroads increased from 176 tons in 1888 to 758 tons in 1929, or by 331 per cent. Improvements in locomotives, cars and road-bed contributed to this. About 1876 the usual weight of locomotives was 20 to 30 tons, with horse-power capacity 300 to 400 tons; weight now is 250 to 300 tons and horse-power 6,000 to 7,000. Trains of present day are handled more safely and with less labor, by means of power brakes, than were the trains of 1888.

Story of Electrical Development

Electricity as now in use is not an original source of power, but a very useful auxiliary of steam power. Many names have been enrolled in the annals of fame for their contributions to the science of electro-magnetism.

Michael Faraday of England, in 1831, accomplished the final demonstration that is credited as the invention of the dynamo. Momentous as his discovery was, the public was slow in appreciating its significance. The power industry was yet in its swaddling clothes, and

the nature of light was not yet understood. It is related that when Faraday explained the electric current to William E. Gladstone, then Chancellor of the Exchequer, the statesman asked "What is it good for?" Faraday's reply was, "Well, maybe some day you can tax it." In the United States in 1934 the power and light companies of the United States paid taxes to the aggregate sum of \$245,000,000.

Electricity in the United States

The first productive use of that new knowledge was in telegraphy, and the next was in the telephone, both developed in the United States, and the latter getting under way about the time that Edison established the first central power station. It was more than fifty years from Faraday's discovery of the possibility of producing electricity from the magnetism excited by a wire coil that the first public service station for the sale of electric current started in business, and, as related last month, that was in Pearl Street, New York City, and owned by the Edison Company. Mr. Orrok says of it:

The invention by Edison of a commercial incandescent light, in October, 1879, with his almost simultaneous invention of an efficient generator and motor, and distribution system on the multiple-arc principle may be said to have started the development of the central station. The announcement of the attainment of a generator efficiency of 90 per cent, more than double what had been achieved before, was made in the *Scientific American* of October 18, 1879, just two days before the start of the 45-hour lamp test which demonstrated the existence of a commercial incandescent light.

The gains in the production of electric current since the Pearl Street installation have been of course mainly in the generation of power by steam from coal, as heretofore described, but the wholesale character of production and distribution gave the engineer freedom to plan for large expenditures to obtain low costs. The turbine engine and modern boiler equipment have been the chief agencies.

The economy of large generator sets where market existed for the current was soon demonstrated, and has encouraged the reduction of service charges to increase volume. Nobody in the industry denies Samuel Insull large credit for his part in this development. He was like Andrew Carnegie in his readiness to scrap equipment of undiminished efficiency for something of higher efficiency. He emphasized the wastefulness of the small plant for individual service. He demonstrated the importance of the 24 hour load. He bought up small municipal plants and scrapped them, hitching the distribution lines to large central stations, led in charge-reductions and rapidly increased consumption in his territory. Other companies did likewise, and the economies in sight stimulated a competition over territory which was greatly increased by the post-war inflation.

The speculative development in the electrical industry was similar to that in real estate and the stock market and all from the same cause, viz.: the abnormal influence of the World War upon all business, and particularly upon prices and finance.

The great service of electrical development is in giving flexibility to the distribution of power—at small expense and with great resulting benefits to the masses of the people. The central power station does away with the necessity for individual plants wherever power is used. The power is produced more economically by the large equipment. Central station power can be delivered in dwelling, store, factory, or farm home, to suit the user's convenience and thus provides the means for decentralizing industry, and building up small industries. It can be applied to all kinds of work, from doing the family washing to running railroad trains, simply by pressing a button. Almost every kind of work around the home can be lightened by electric power.

When America was colonized artificial light was provided outdoors by fires, hand torches, and lanterns containing tallow candles or perhaps whale oil; indoors by candles, (work for women) whale oil or the fire-place. After the 1850's kerosene came in, at first explosive and inflammable, but eventually a great improvement. Candles were retired gradually, but not entirely. In the cities, gas light with the fish tail burner afforded a dim, religious light, but not very good to read by. The incandescent light of 1882, using about six or seven watts per candle power, has been improved until the ordinary tungsten lamp now used in homes furnishes a candle power on less than one watt. The life of the incandescent lamp also has been lengthened, from about 500 hours to over 2,000.

The industry has been doubling the volume of its output on the average about once in seven years, and the aggregate of investments starting from scratch in 1880, is now over \$12,000,000,000.

We will not enlarge upon the benefits rendered to the American people by the other electrical industries, viz.: the telegraph, telephone and radio, although they are worthy of emphasis.

The following table gives the average charge for electricity in household use in the United States at about five year periods since the Pearl Street Edison station was established:

Year	Cts. per Kwt.	Year	Cts. per Kwt.
1882	25.0	1915	8.00
1890	23.0	1920	7.45
1895	21.0	1925	7.30
1900	17.0	1930	6.03
1905	12.45	1934	5.30
1910	9.62		

Note should be made of the fact that these figures are for current used in households and do not reflect the influence of wholesale prices to industries. Furthermore, it is to be considered that the reductions since 1915 have been despite the general rise of all industrial costs, including about 150 per cent in the wage rates. The average unit price of domestic electricity at the end of 1934 was 38 per cent below the corresponding average in 1913.

The extent to which electrical power is used in the homes and industries of this country is shown by the following table, giving groups of consumers and number of consumers in each group in 1934, also the total sales during the year to each group, in kilowatt hours:

Customers and Sales of Electric Light and Power Industry in 1934

	Customers (average for year)	Kilowatthours Sold
Domestic	20,265,890	12,797,635,000
Commercial and industrial....	4,232,262	50,069,307,000
Municipal street-lighting	526,550	2,203,484,000
St. and interurban railway....	38,377	4,352,119,000
Electrical steam ry.	637	702,664,000
Municipal and others.....	28,752	656,571,000
Total.....	24,565,945	70,781,780,000

Sources: Edison Electric Institute.

Employment in the Electrical and Directly-Allied Industries

As bearing upon the oft-repeated statement that modern industrial development diminishes employment, the following table is given showing the number of employes on the payrolls of the industries engaged in the production and distribution of electrical current, together with the industries that have been directly created by electrical development, as reported by the United States Census for 1931 and 1932:

Employment in the Electrical and Directly-Allied Industries

Manufacturing (1931 Census of Manufacturers)	
Electrical machinery and supplies (general)	180,106
Radio Apparatus.....	36,490
Mechanical Refrigerators.....	22,752
Washing and ironing machines, etc.....	6,201
Electric railroad repair shops.....	26,629

Generating and Service: (1932 Electrical Census)

Light and power establishments	
Commercial	225,557
Municipal	19,016
Electric railways.....	182,165
Telephones	320,763
Telegraphs and cables.....	66,723
Grand Total.....	1,086,402

(See note following table entitled Employment in the Automotive and Petroleum Industries.)

Power by the Explosion Engines

The power exerted by the steam engine comes from the steam which is produced by the attached furnace and boiler. Because this

generation of power takes place outside of the engine it is said to be by "external combustion." Other natural substances, notably oil and the gases, likewise contain stores of latent energy, but being more rapidly combustible than coal, they tend to give off their energy explosively instead of gradually. On this account the principle of "internal combustion" has been resorted to. The gaseous fuel is introduced into the engine and the power is released and applied directly by the explosion. Thus the functions of furnace, boiler and engine are combined in the internal combustion engine.

That tremendous explosive power existed in gases have been known for a long time. As the forests were cut away, resort was had to coal for fuel, and as mines extended into the ground, experience was had with fire-damp, a gas resulting from decomposing coal, which by combining in certain proportions with oxygen in air caused terribly disastrous explosions. Similar explosions may occur in the fine dust of an inflammable substance, as experienced in flouring mills. Such explosions revealed a tremendous natural force bursting out of matter, before anybody understood it. Naturally, however, some of the "exceptional men" were early thinking about how such forces might be usefully controlled. Unfortunately, the early efforts seem to have been applied largely to use in warfare, and some of the most remarkable recent achievements have been in that line.

Experiments upon internal combustion motors had been going on for several hundred years, without much of tangible results until about the middle of the last century. At the Paris exposition of 1867 fifteen such engines were exhibited and among them the invention of Otto of Germany, who eventually won fame and fortune from it. By this pioneer work on the engine, the development of the automobile found its motive power waiting, together with cheapened steel and increased supplies of rubber and gasoline. It was a fortunate juxtaposition of factors required to create another great industry, but happened because the free economic system is always alert to accomplish just such developments.

In the first article of this series we had something to say of the services of the various kinds of automotive equipment to the people of this country. We need not repeat what was said about services in transportation or of benefits to the health of the people, although it would bear repetition, but we would like to refer to some of the dire predictions made in the early years. In the first expansion of motor car buying the situation was considered alarming. Plausible calculations were made to show that there would be no buying power left to support the other industries or to pay taxes

or debts. It is conceivable that at one time (before so many people had cars), a system of "planned economy," if then in force, might have attempted to regulate the national expenditures upon automobiles, but happily the other industries were rapidly geared up to the automobile pace, and "universal bankruptcy" was thus averted. Notwithstanding the enormous shift of purchasing power resulting from their developments, the automotive industries have been constantly a stimulating factor in the life of the country, and they are doing their part for "recovery" now.

Doubtless much money has been spent in automobiling that might better have been spent otherwise, but that is true of all spending. It is well that people shall have what they want and are willing to work for. Wants are the greatest spur to thought and effort, and the thinking and striving constitute the chief educational process. Freedom to think, plan and order one's own life is the prime necessity for individual development and social progress.

The Diesel engine is another internal combustion engine, introducing new ideas, and using an atomized fuel of lower grade than gasoline. It had its origin about forty years ago in Germany, and has been improved from time to time. Sensational things are predicted of it, based in part upon its recent achievements in pulling fast-running railroad trains and promising performances with agricultural tractors.

The field of possibilities in internal combustion motive power is very wide since the theory of solid "atoms" as the basis of matter has been abandoned. The latest consensus of opinion among the scientists is that the universe is "charged with energy," and it remains to be seen how far beyond his past achievements man may be able to draw upon it for his uses.

Employment in the Automotive Industries

Pursuing further the much agitated question whether the advance of knowledge, the increased variety of "desirable things" and increased capacity for making them, together with the increased facilities for transporting and exchanging them, tends to diminish the demand for labor and increase unemployment, we give herewith a statement, made up from recent census reports, of employment arising directly from the automotive and petroleum industries. Although petroleum products are not all consumed by the automotive industries, the latter have furnished the chief demand for them, and all of these industries have developed closely together. The same is true of highway construction.

Employment in the Automotive and Petroleum Industries

Manufacturing:	
Motor Vehicle Manufacturing.....	323,237
Aircraft Manufacturing.....	9,870
Motor Cycles Manufacturing.....	3,294
Petroleum refining.....	69,055
Tire Manufacturing.....	52,976
	458,432
Sales & Servicing:	
Motor vehicle dealers.....	296,831
Filling stations and garages.....	521,641
Wholesalers of petroleum products.....	118,902
All others (inc. tire and battery dealers)....	184,379
	1,121,753
Road Construction.....	549,203
Truck and Bus Drivers.....	2,639,662
Aviation employees.....	8,977
Oil and Gas wells, pipe lines, etc.....	118,928
Grand Total.....	4,896,955
Total of employment in electrical Industries	1,086,402
Combined electrical, automotive and petroleum industries	5,983,357

Note: This table and the similar one on the electrical industries do not include a large amount of employment arising from these industries, but classified by the census in other industries. Thus musicians and actors employed in radio are classed in their own professions, and many chauffeurs and delivery men in private service, are included in household service or other employments. Workers engaged in the production of materials for the automotive industries and for highway construction are not included.

The Vast Increase in the Use of Power

After the preliminary statements about the ignorance of primitive society and the beginnings of economic development, to illustrate the gradual process, the foregoing is all about the development of power. The most significant of all changes affecting the living conditions of the people has been this development of power. As an appropriate comment by an eminent authority, we take a few sentences from the introduction to the book, "Germany and Its Evolution in Modern Times", by Henri Lichtenburger:*

The great fact which strikes us when we compare the present day with the ages that have preceded it is the enormous growth in human power which took place during the course of the last century. It is possible to have some doubts about the "progress" of humanity, in the sense that it is very far from certain that the man of today is happier, wiser, or even in a safer position than he was formerly. On the other hand, it is perfectly clear that the sum-total of human power in the face of nature has increased enormously. The conquest and subjugation of elemental forces by the intelligence of man made a tremendous stride during the nineteenth century.

Machine development in the production of power of course preceded machine development in all the industries using power and opened the way to it. Already animal power had been applied to machines, notably in agriculture, but engine-power began a new era. The "exceptional man" became exceptionally busy with new devices. As one of the eminent-

* Published by Henry Holt & Co. New York, 1913.

ly practical kind, able to put his ideas directly into working form, we name Eli Whitney, best known as the inventor of the cotton gin. That would be fame enough for one man, but he did something of even greater significance in being the first to effect the division of labor so that each part of a combined mechanism was made separately. This introduced interchangeability. In the recent celebration of the Connecticut Tercentennial he has come into deserved attention. A correspondent of the New York Sun, October 9, 1935, pays this tribute:

It is a commonplace today, but if interchangeable manufacture had not been resorted to by Whitney, North and the Connecticut clock makers, then generally by world industry, a motor truck today would have to be custom made, each part laboriously fashioned for a particular truck and not interchangeable with parts made for another truck. Whitney's methods turned the cobbler's bench into a shoe factory, the tailor's shop into the clothing factory, the gunsmith's shop into the arms factory. Mass production and its basic method are taken for granted now, but when they began in a small way in Eli Whitney's musket factory at Whitneyville in the last years of the eighteenth century they were looked upon as visionary aspirations and excited much ridicule.

The growth of industry under the influence of the constant extension of scientific knowledge about the natural resources, quickly utilized in production by men like Whitney, has resulted in an enormous increase in the volume of goods and services moving in the exchanges. It is important to emphasize the word "exchanges", for it signifies that the goods and services normally pay for each other. There is no limit to useful production if trade is reciprocal.

Before closing, we think it in order to reproduce a table that appeared in these columns in December, 1934, showing the increase in the output of the manufacturing industries of the United States from 1899 to 1929. The table is of index numbers with 100 for the base of each column and representing the census figures for 1899; the figures for following years are percentages of the base. The census of manufactures was taken every fifth year until 1919 and every second year thereafter. Price changes are allowed for, so that these are comparable figures of physical output. The calculation was

made by Professor Frederic C. Mills of Columbia University, an authority in statistical research, for the National Bureau of Economic Research, Inc., and published under its auspices.

This table shows that in these thirty years the average per capita output of all wage-earners in the manufacturing industries increased by approximately 90 per cent, or nearly doubled. This is a continuance, at a higher rate, of all the progress that has been going on in the past. Furthermore, the table shows that the number of wage-earners in these industries increased at approximately the same rate as the total population.

Questions Suggested

This is as far as the discussion can be carried in this article, but we submit that the foregoing has bearing upon numerous questions that are of vital interest today. Would the common welfare have been served better if any of the discoveries that have increased the command of man over the resources of Nature (power development, for example) had *not* been made, or if any of the inventions or improvements in industry that have increased the efficiency of labor in production had been suppressed and forever abandoned, as in many instances was urged? What are the lessons of the past on this subject?

This question is especially pertinent in view of the announcement from the League of Nations Labor Board, at Geneva, within the past month, to the effect that the Board had voted to submit to the annual meeting next June, a recommendation that all nations represented in the organization henceforth shall restrict the operations of the textile industries to forty hours per week. This proposal was sponsored by the delegation from the United States.

If this is done in the textile industries, like action for other industries will naturally follow; moreover, a bill to restrict industry generally to a thirty-hour week has been pending before our own Congress, and doubtless will be re-introduced at the next session.

Is it time to stop progress? Have we had enough of it? Must we in the future adopt the rule that all improvements in the methods of production shall be counteracted by reducing the hours of machine operations? Would the wage-workers of this country rather have more idle time or more of the products of the industries?

Is there any certainty that the depression has resulted from having too much of everything? Is it not more likely that some mix-up in trade relations has slowed down the exchanges? We submit that the story of past progress suggests these inquiries and leads straight to the heart of the subject.

Productivity of the Manufacturing Industries
Index Numbers Base 1929 = 100

Census Year	U. S. Population	Physical Volume of Production	Number of Wage Earners	Output per Wage Earner
1899.....	100	100	100	100
1904.....	110.4	120.2	108.1	111.2
1909.....	121.1	154.5	130.0	118.9
1914.....	130.9	176.3	136.1	129.6
1919.....	140.3	225.1	169.4	133.0
1921.....	144.5	186.3	136.2	136.9
1923.....	148.9	275.6	177.3	155.5
1925.....	153.4	282.2	169.1	166.9
1927.....	158.0	287.2	163.6	175.7
1929.....	162.3	311.4	164.2	189.7

See Tables pp. 26, 192, 290, "Economic Tendencies."

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